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EXAMINER

CANTELMO, GREGG

ART UNIT PAPER NUMBER

1745

DATE MAILED: 11/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/687,232

Applicant(s)

CHANG ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. In response to the amendment received August 14, 2006:
 - a. Claims 1-21 are pending;
 - b. The 112 rejection stands;
 - c. The prior art rejections of record are withdrawn in light of the amendment.

Claim Objections

2. Claims 1-21 are objected to because of the following informalities: the term "photon-exchange membrane" should be --proton exchange membrane--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-21 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "fuel" in claims 1-21 is used by the claim to mean a hydrogen fuel reactant and oxidant reactant, while the accepted

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meaning is "a hydrogen comprising reactant." The term is indefinite because the specification does not clearly redefine the term. The term fuel is commonly directed to the hydrogen comprising reactant (e.g., natural gas, methane, methanol, etc.) but is not a commonly applied term to the cathode reactant (being a source of oxygen or oxidant). Applicant is advised to amend the term "second fuel" to more accurately refer to the oxidant source.

Response to Arguments

4. Applicant's arguments filed August 14, 2006 have been fully considered but they are not persuasive. While Applicant's arguments have been considered the Examiner maintains that the application of the term "fuel" to describe the oxidant source is not a common application of the term in the art. Fuel is used to describe the anode reactant whereas an oxidant is used to describe the cathode reactant. The term fuel is not commonly applied to describe the oxidizing cathode reactant. Again it is suggested that the term be amended from fuel to oxidant, for example, to overcome this rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 5, 6, 10, 12 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,638,654 (Jankowski).

Jankowski discloses of an apparatus and method of fabricating a fuel activation assembly for use in a fuel cell, the fuel cell comprising a first cell compartment for containing a first fuel component and a second cell compartment for containing a second fuel component, wherein the fuel activation assembly is disposed between the first cell compartment and the second cell compartment so as to activate the first fuel component for producing protons in the first cell compartment and for channeling the protons to the second cell compartment, said method comprising the steps of: providing a substantially planar substrate 44 in the fuel cell, the substrate having a first surface facing the first cell compartment and an opposing second surface facing the second cell compartment, the substrate having a plurality of apertures 43 made through the first surface and the second surface; and securely attaching a plurality of membrane electrode assembly segments 41 to the substrate over the apertures 43, each membrane electrode assembly segment 41 comprising a proton-exchange membrane sandwiched between two activation layers, wherein each membrane electrode assembly segment 41 has a first side and an opposing second side, the second side adjacent to the second cell compartment, the first side adjacent to the first cell compartment for activating the first fuel component in order to produce the protons and for channeling at least part of the protons from the first cell compartment to the second cell compartment via the apertures through the membrane electrode assembly segments (Figs. 2 and 3 as applied to claims 1, 5 and 12).

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The fuel cell further comprising a first electrically conducting terminal operatively connected to the first cell compartment; and a second electrically conducting terminal operatively connected to the second cell compartment, so as to allow a current load to connect to the first and second electrically conducting terminals to use the electrical current (as applied to claim 6).

Each MEA includes a proton exchange membrane sandwiched between two electrode layers (Fig. 3 as applied to claims 10 and 13).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view of JP 11-045729 (JP '729).

The teachings of Jankowski have been discussed above with respect to the fuel cell arrangement.

Jankowski does not teach of the fuel cells having a heat bonding process for sealing the fuel cell.

JP '792 discloses using hot-melt seals in PEM fuel cells to seal the reactants from one another and from external contaminants.

The motivation for using sealing the fuel cell substrate is that it improves the integrity of the seal in the microfuel cell and provides an improved seal barrier between the anode and cathode of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by providing an adhesive to the sealing of the fuel cell since it would have improved the integrity of the fuel cell seal and provided an improved seal barrier between the anode and cathode of the fuel cell.

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7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view of either U.S. Patent No. 6,960,403 (Morse) or U.S. Patent Application Publication No. 2005/0019635 (Arroyo).

The teachings of Jankowski have been discussed above with respect to the fuel cell arrangement.

The differences between claim 3 and Jankowski is that Jankowski does not teach of using an adhesive to create a barrier (claim 3).

Morse discloses sealing a microscale planar fuel cell between adjacent substrates (Fig. 2) wherein the sealing is provided to prevent reactant crossover between the anode and cathode. The bonding material is provided with an adhesive (col. 3, ll. 30-32). Arroyo discloses using an adhesive bonding to seal opposing base plates in a direct methanol fuel cell (para. [0068], [0097], [0100] and [0101]). The motivation for using an adhesive is that it improves the integrity of the seal in the microfuel cell and provides an improved seal barrier between the anode and cathode of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by providing an adhesive to the sealing of the fuel cell since it would have improved the integrity of the fuel cell seal and provided an improved seal barrier between the anode and cathode of the fuel cell.

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8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view of Morse or Arroyo as applied to claim 3 above, and further in view of Koripella.

The difference not yet discussed is of the fuel being a mixture of methanol and water.

The fuel mixture of Jankowski can include methanol (col. 3, ll. 5-10).

Koripella teaches of using a diluted methanol fuel (col. 1, ll. 28-33).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by providing a dilute methanol fuel since and further since the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

9. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view of Koripella.

The substrate is composed of a material selected from the group consisting of silicon, glass, ceramic, and plastic which is inherently resistant to diluted methanol mixtures (prior art claim 5 as applied to instant claim 7).

The oxygen source was simply air on the top side of the structure (Jankowski, paragraph bridging columns 6 and 7 as applied to claim 9).

The difference not yet discussed is of the fuel being a mixture of methanol and water.

The fuel mixture of Jankowski can include methanol (col. 3, ll. 5-10).

Koripella teaches of using a diluted methanol fuel (col. 1, ll. 28-33).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by providing a dilute methanol fuel since and further since the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view of U.S. Patent No. 6,127,058 (Pratt).

The teachings of Jankowski have been discussed above with respect to the fuel cell arrangement.

The difference between claim 11 and Jankowski is that Jankowski does not teach of using diffusion layers over the electrodes.

According to Pratt: Electrodes of the MEA have several functions. They must: 1) diffuse oxygen and hydrogen evenly across the surface, 2) allow water molecules to escape (principally a cathode-side issue), 3) hold back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyze the reactions, 5) conduct electrons so they can be collected and routed through an electrical circuit, and 6) conduct protons a very short distance to the proton exchange membrane. To accomplish these disparate needs, MEAs typically consist of several layers of various forms of carbon and polymers in addition to the catalyst. Both the water management

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and the electron conduction functions are satisfied with dual role diffusion layers which are sandwiched over the catalyst layers. These diffusion layers are usually comprised of woven carbon fiber cloth or porous carbon paper. In practice, the diffusion layer can be integral to the electrodes, integral to the current collectors, or a separate piece sandwiched between the current collector and the electrode. In our preferred embodiment, the diffusion layer is incorporated in the electrodes, but it can also be part of the current collector or a separate piece. For simplicity, we assume that the diffusion layer does not restrict the relative proximity of the current collector and the electrode.

The motivation for using diffusion layers in the electrodes or adjacent to the electrodes in an MEA is that it diffuses oxygen and hydrogen evenly across the surface, 2) allows water molecules to escape (principally a cathode-side issue), 3) holds back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyzes the reactions, 5) conducts electrons so they can be collected and routed through an electrical circuit, and 6) conducts protons a very short distance to the proton exchange membrane.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowksi by employing diffusion layers in the electrodes or adjacent to the electrodes in an MEA since it would have diffused oxygen and hydrogen evenly across the surface, 2) allowed water molecules to escape (principally a cathode-side issue), 3) held back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyzed the reactions, 5) conducted electrons so they can be collected and routed through an

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electrical circuit, and 6) conducted protons a very short distance to the proton exchange membrane.

11. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowksi in view of either DE 19624887 (DE '887) or U.S. Patent No. 6,127,058 (Pratt).

The teachings of Jankowksi have been discussed above with respect to the fuel cell arrangement.

Jankowksi does not teach of the fuel cells being connect in parallel (claim 14), series (claim 15) or in parallel and in series (claim 16).

DE '887 discloses that connecting plural fuel cells both in parallel and in series permits the fuel cells to more readily match required load demands. Referring now to FIG. 3, when the fuel cell 20 is laminated together, the interconnect means 26 in each of the current collector assemblies 21, 22 are connected to each other outside the periphery of the MEA to provide a path for electron transfer between anodes and cathodes. These connections 32, while shown as a series circuit, can also be arranged in parallel, or in a combination of series/parallel, depending on the output desired from the fuel cell (Pratt, col. 4, ll. 40-55)

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowksi by providing a series circuit, parallel circuit, or a combination of series/parallel circuitry, depending on the output desired from the fuel cell.

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12. Claims 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view of U.S. Patent No. 7,033,691 (Mardilovich).

The teachings of Jankowski have been discussed above with respect to the fuel cell arrangement and are incorporated herein.

Jankowski further teaches that the fuel cell design therein is provided as "battery replacements" and therefore obviously used in portable electronic devices.

Jankowski does not teach of the particular load.

The use of direct methanol fuel cells in various portable electronic devices, including portable computers and PDAs is a well known power source for such devices as shown by Mardilovich (col. 1, ll. 20-40). The motivation for using fuel cells in portable computers or PDAs is that it provides the portable electronic device with a light-weight, reusable, efficient, and reliable power sources.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by selecting the load to be a portable electronic device since it would have provides a portable electronic device having an alternative power source which is light-weight, reusable and more efficient than conventional batteries.'

Response to Arguments

13. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

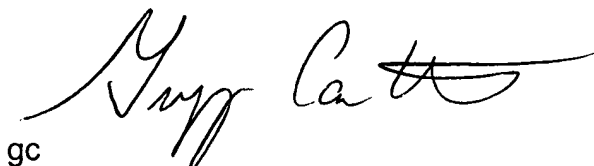
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gc

October 30, 2006

Gregg Cantelmo
Primary Examiner
Art Unit 1745